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TFA IMAGE SENSOR WITH STABILITY-OPTIMIZED PHOTODIODE

Claims

1. A TFA image sensor with stability-optimized photodiode for converting electromagnetic radiation into an intensity-dependent photocurrent with an intermetal dielectric, on which, in the region of the pixel matrix, a lower barrier layer (metal 2) is situated and a conductive layer (metal 2) is situated on said barrier layer, and vias being provided for the contact connection to the ASIC, said vias ending in metal contacts on the ASIC, **characterized** in that an intrinsic absorption layer (i) is provided between the TCO layer and the barrier layer (metal 2) with a layer thickness of between 300 nm and 600 nm.

2. The TFA image sensor as claimed in claim 1, **characterized** in that the layer thickness of the intrinsic absorption layer (i) is approximately 450 nm.

3. The TFA image sensor as claimed in claims 1 and 2, **characterized** in that the band gap of the intrinsic absorption layer (i) of the photodiode is increased.

4. The TFA image sensor as claimed in one of claims 1 to 3, **characterized** in that the increase in the band gap is realized by using an amorphous silicon-carbon alloy (a-Sic:H) as absorption layer.

5. The TFA image sensor as claimed in one of claims 4, **characterized** in that, in particular, the photodiode of reduced layer thickness is arranged on a surface that is as planar as possible.

6. The TFA image sensor as claimed in one of claims 1 to 5, **characterized** in that the photodiode with small intrinsic layer thickness is deposited on an ASIC having a flat surface topography.

7. The TFA image sensor as claimed in one of claims 1 to 6, **characterized** in that the ASIC is coated with a passivation.

8. The TFA image sensor as claimed in one of claims 1 to 7, **characterized** in that, within the pixel matrix, firstly the back electrodes of all the pixels are connected to one another via the topmost CMOS metal plane, which is made planar in the region of the pixel matrix.

9. The TFA image sensor as claimed in claim 8, **characterized** in that the metal plane is situated on a CMP-planarized surface (CMP = Chemical Mechanical Polishing) of the topmost intermetal dielectric layer.

10. A method for fabricating a TFA image sensor as claimed in one of claims 1 to 9, **characterized** in that, before the application of the photodiodes, the topmost, comparatively thick metal layer of the ASIC is removed and replaced by a matrix of thin metal electrodes which form the back electrodes of the photodiodes, said matrix being patterned in the pixel raster.

11. The method as claimed in claim 10, **characterized** in that an antireflection layer that is present and the metal layer are completely removed above the pixel matrix, so that all that remains is the barrier layer situated underneath.

12. The method as claimed in claim 10, **characterized** in that the lower barrier

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layer is completely removed, this then being followed by the deposition and patterning of the further metal layer in the form of pixel back electrodes.

13. The method as claimed in one of claims 10 to 12, **characterized** in that the ASIC passivation is opened in the photoactive region of the TFA sensor.

14. The method as claimed in one of claims 10 to 13, **characterized** by the removal of the antireflection layer of the upper metalization layer of the ASIC in the photoactive region of the TFA sensor.

15. The method as claimed in one of claims 10 to 14, **characterized** by the removal of the conductive layer of the upper metalization layer of the ASIC in the photoactive region of the TFA sensor.

16. The method as claimed in one of claims 10 to 15, **characterized** by patterning or removal of the lower barrier layer of the upper metalization layer of the ASIC in the photoactive region of the TFA sensor.

17. The method as claimed in one of claims 10 to 16, **characterized** by deposition and patterning of a further metal layer.

18. The method as claimed in one of claims 10 to 17, **characterized** by deposition and patterning of further layers, such as color filter layers.

19. A method for fabricating a TFA image sensor as claimed in one of claims 1 to 9, **characterized** by

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- opening of the ASIC passivation in the photoactive region of the TFA sensor,

- removal of the antireflection layer of the upper metalization layer of the ASIC in the photoactive region of the TFA sensor,

- removal of the conductive layer of the upper metalization layer of the ASIC in the photoactive region of the TFA sensor,

- patterning or removal of the lower barrier layer of the upper metalization layer of the ASIC in the photoactive region of the TFA sensor,

- deposition and patterning of a further metal layer,

- deposition and patterning of the photodiode layers,

and

- deposition and patterning of further layers, such as color filter layers.